WHAT IS CLAIMED IS:

1. A method of diagnosing a membrane fluidity-related disorder, or a predisposition to a membrane fluidity-related disorder, in a mammalian subject, the method comprising:

acquiring a first proton relaxation measurement for a selected region of the brain of the subject in a magnetic resonance imaging (MRI) procedure;

administering to the subject a challenge that alters a physical or chemical property of cell membranes in the brain of the subject;

acquiring a second proton relaxation measurement for the selected region of the brain in an MRI procedure after the challenge; and

detecting any difference between the first proton relaxation measurement and the second proton relaxation measurement, wherein a difference indicates a membrane fluidity-related disorder.

2. The method of claim 1, wherein the disorder is selected from the group consisting of bipolar disorder, alcoholism, Alzheimer's disease, major depression, and schizophrenia.

3. The method of claim 1, wherein the disorder is bipolar disorder.

4. The method of claim 1, wherein a decrease in a T2 proton relaxation measurement after the challenge indicates a disorder.

5. The method of claim 4, wherein the disorder is Alzheimer's disease or bipolar disorder.

6. The method of claim 1, wherein the challenge comprises administering to the subject an effective amount of a compound selected from the group consisting of an omega-3 fatty acid, S-adenosylmethionine, a statin, and a cytidine compound.

7. The method of claim 1, wherein the challenge comprises administering to the subject an effective amount of one or more omega-3 fatty acids for an effective length of time.

8. The method of claim 5, wherein the omega-3 fatty acids comprise a fatty acid selected from the group consisting of docosahexanoic acid, eicosapentanoic acid, and linolenic acid.

9. The method of claim 7, wherein the omega-3 fatty acids are from a fish oil.

10. The method of claim 7, wherein the effective length of time is from 3 days to 6 weeks.

11. The method of claim 7, wherein the effective length of time is from 5 days to 4 weeks.

12. The method of claim 1, further comprising acquiring a third proton relaxation measurement for the selected region of the brain.

13. The method of claim 7, wherein the effective amount of the omega-3 fatty acids is an oral dosage of 0.1 gram to 10 grams per day.

14. The method of claim 7, wherein the effective amount of the omega-3 fatty acid is an oral dosage of 0.5 gram to 5 grams per day.

15. The method of claim 1, wherein the proton relaxation measurement is a T1 value or a T2 value.

16. The method of claim 1, wherein the MRI procedure comprises using incrementally increased or decreased echo times (TE), repetition times (TR), or inversion times (TI).

17. The method of claim 16, wherein T2 is calculated for each pixel.

18. The method of claim 1, wherein the MRI procedure comprises acquiring at least 16 images, using an echo planar, spin echo imaging sequence.

19. The method of claim 1, wherein the reproducibility of the proton relaxation measurement is within 2%.

20. The method of claim 1, wherein the subject is a human.

21. A method of assessing the effectiveness of a neurological or psychiatric treatment in a mammalian subject, the method comprising:

acquiring a first proton relaxation measurement for a selected region of the brain in a magnetic resonance imaging (MRI) procedure;

administering to the subject a neurological or psychiatric treatment;

acquiring a second proton relaxation measurement for the selected region of the brain in an MRI procedure; and

detecting any difference between the first proton relaxation measurement and the second proton relaxation measurement, wherein a difference indicates that the treatment has an effect on the subject.

22. The method of claim 21, wherein the subject is a human patient.

23. The method of claim 21, wherein the subject is an animal.

24. The method of claim 21, wherein a decrease in a T2 measurement indicates that the treatment has an effect on the subject.

25. A method of assessing the effectiveness of a neurological or psychiatric treatment in a subject, the method comprising:

acquiring a first, pre-treatment proton relaxation measurement for a selected region of the brain in a magnetic resonance imaging (MRI) procedure;

administering to the subject a pre-treatment challenge that alters a physical or chemical property of cell membranes in the brain of the subject;

acquiring a second pre-treatment proton relaxation measurement for the selected region of the brain in an MRI procedure;

detecting any difference between the first pre-treatment proton relaxation measurement and the second pre-treatment proton relaxation measurement, thereby obtaining a pre-treatment challenge result;

administering a neurological or psychiatric treatment to the subject;

acquiring a first, post-treatment proton relaxation measurement for a selected region of the brain in an MRI procedure;

administering to the subject a post-treatment challenge that alters a physical or chemical property of cell membranes in the brain of the subject;

acquiring a second post-treatment proton relaxation measurement for the selected region of the brain in an MRI procedure;

detecting any difference between the first post-treatment proton relaxation measurement and the second post-treatment proton relaxation measurement, thereby obtaining a post-treatment challenge result; and

comparing the pre-treatment challenge result with the post-treatment challenge result, wherein a difference between the pre-treatment challenge result and the post-treatment challenge result indicates that the treatment has an effect on the subject.

26. A method of diagnosing a membrane fluidity-related disorder, or a predisposition to a membrane fluidity-related disorder, in a subject, the method comprising:

acquiring a proton relaxation measurement for a selected region of the brain in a magnetic resonance imaging (MRI) procedure, thereby obtaining a test value; and

comparing the test value with a predetermined range of standard values for proton relaxation measurements,

wherein a test value outside the predetermined range of standard values is indicative of a membrane fluidity-related disorder, or a predisposition to a membrane fluidity-related disorder.